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FISHERIES

OVERVIEW OF REVEALED PREFERENCE MODELS

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Overview of revealed preference models

- Purpose
 - Provide insights into recreational behavior and economic value of recreational trips and attributes of those trips
- Underlying economic theory
 - Utility maximization
 - Weak complementarity
- Assumptions
 - 'Price' reflects monetary and nonmonetary constraints on recreational participation



Data requirements of revealed preference models

- Fishing patterns of participants
 - E.g., number of angler days (for seasonal demand models) by site/mode/target species
- Characteristics of recreational alternatives (e.g., catch rates)
- Characteristics of recreational participants (e.g., boat ownership, income, other demographics)
- Non-participant data

Potential applications of revealed preference models

- Fishery management
- Project evaluation (e.g., Klamath dam removal)
- Natural resource damage assessment (e.g., Gulf oil spill)
- Ecosystem management (including non-fishery recreation)



Potential usage of revealed preference models for fishery management

- Regulatory analysis
 - Economic effects of management alternatives on recreational fishery
 - Analysis of rebuilding
 - 'Front end' behavioral assumptions underlying regional impact assessment of management alternatives
- SAFE reports
 - Provide context and interpretation of fishery trends
- General insights into angler behavior (helpful for management/monitoring)
 - E.g., effort shifts among fishing modes/target species/sites



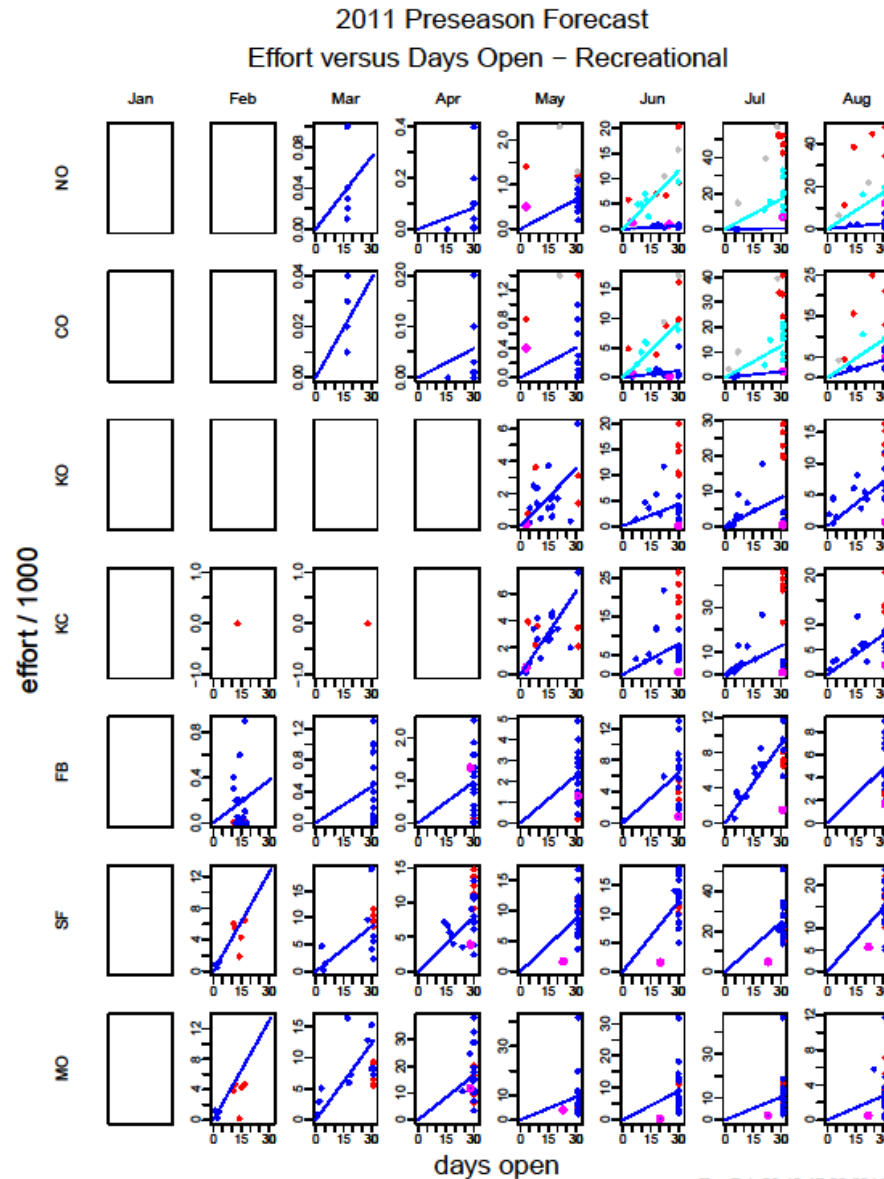
How well do revealed model address management needs?

- Management needs differ by region
- Pacific Fishery Management Council
 - Non-recreational issues (e.g., ACLs, groundfish trawl catch shares, stock assessment/biological aspects of rebuilding) have had higher priority
 - States manage recreational fisheries, not feds
 - Current PFMC recreational priorities: accurate estimates of total fishing mortality (MRIP), pre-season projection and in-season monitoring of recreational groundfish and salmon fisheries – likely to be increasingly important in other regions due to ACLs
 - Pending: allocation as follow-up to ACLs



Example: salmon season length vs effort

(source: Michael O'Farrell, NMFS)



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Addressing PFMC needs

	PFMC projection models	Revealed preference models
Focus	Regs→Effort→Harvest	Econometric advances, behavioral insights
Data	Aggregate data, time series, parsimonious, good values of predictors must be available pre-season	Micro data, cross sectional, post-season values sometimes used as proxies for pre-season values which are not known in advance
Criteria for 'success'	Accuracy of projections, timeliness	Utility theoretic, statistical significance of coefficients
Potential connection	Behavioral insights from RP models may help to improve projections	



Examples of use of revealed preference methods: Klamath dam removal

- Estimation of consumer surplus/angler day for ocean recreational salmon fishery
 - Zero truncated negative binomial
 - 2000 angler survey data (more recent surveys occurred during salmon closures)
 - Disparate estimates of consumer surplus (\$99-\$309), depending on assumptions regarding travel cost (\$0.122 or \$.491/mile), value of time (1/3 or 2/3 wage rate), and whether on-site expenses included or not.
- Benefits transfer
 - In-river salmon fishery: \$34-\$103/angler day
In-river steelhead fishery: \$39-\$203/angler day
 - Old studies (1980s, 1990s)
 - Broad range: heterogeneity of recreational experiences, ad hoc decisions by modeler



Methodological advances

Model type	
Extreme corner solution (RUM)	Deal with important (discrete) aspects of angler decision making (e.g., site, target species, mode choices) Link to seasonal demand made outside the model
Corner solution	Addresses seasonal demand Binding non-negativity constraints Allows consideration of non-participants
Dynamic	Seasonal demand in dynamic programming context



Some aspects of revealed preference models that warrant additional research (short term)

- Need more studies relevant to NMFS-managed fisheries (available studies often outdated)
- Focus on aspects of model improvement that provide insights into angler behavior, even if not econometrically novel
- Survey prep: use focus groups/cognitive interviews to better address some of ad hoc decisions that go into model development (particularly decisions that influence consumer surplus estimates)
- Model automation? Maybe for simple models. Make sure that have economist oversight.



Some aspects of revealed preference models that warrant additional research (long term)

- Implicit price: opportunity cost of time, travel cost
- Defining choice set that is meaningful to anglers
- Qualities of recreational experience and aspects of regulations that influence angler behavior
- Multipurpose trips
- Multispecies catch
- Dynamic behavior: fishery entry/exit, expectation formation, adjustment of expectations to changes in fishery conditions



What are primary obstacles to using revealed preference models?

- Data
 - S&T funding available for periodic surveys
 - Survey design/pretesting/clearance/administration is time consuming and labor intensive
- Skills required
 - Specialized expertise needed for both data collection and analysis
- Resources
 - FTEs appear to be resource in shortest supply
- Appropriateness
 - Serves some purposes but not always what management needs
- Time requirements
 - May be useful (depending on particular application) even if provided on different time scale than management cycle